

CLAIMS

What is claimed is:

- 1 1. A transmitter comprising:
2 a phase difference element to generate a phase reference signal from phase
3 information extracted from an offset input signal and an offset output signal;
4 an amplitude difference element to generate an amplitude reference signal
5 from amplitude information extracted from the offset input signal and the offset
6 output signal;
7 a signal synthesizer to synthesize an output signal from the amplitude
8 reference signal and the phase reference signal;
9 an input combining element to combine an input signal with an origin-
10 offset signal to produce the offset input signal; and
11 an output combining element to combine the output signal and the origin-
12 offset signal to produce the offset output signal.
- 1 2. The transmitter of claim 1 further comprising a carrier leakage
2 compensation element to adjust an amplitude and phase of the origin-offset signal
3 based on a carrier leakage level of the output signal to provide a compensated
4 origin-offset signal to the input combining element.
- 1 3. The transmitter of claim 2 wherein the carrier leakage compensation
2 element adjusts the origin-offset signal either based on a ratio of an RMS level
3 and an average level of the output signal or based on detection of carrier leakage
4 in a non-linearly amplified output signal.
- 1 4. The transmitter of claim 2 wherein the input signal is a baseband signal
2 and wherein the carrier leakage compensation element is implemented within a
3 digital signal processor and adds the origin-offset signal directly to the input
4 signal.

1 5. The transmitter of claim 1 further comprising:
2 an input phase detector to extract phase information from the offset input
3 signal;
4 an input amplitude detector to extract amplitude information from the
5 offset input signal;
6 a feedback phase detector to extract phase information from the offset
7 output signal; and
8 a feedback amplitude detector to extract amplitude information from the
9 offset output signal.

1 6. The transmitter of claim 1 further comprising an origin-offset signal
2 generator to generate the compensation signal.

1 7. The transmitter of claim 6 wherein the origin-offset signal includes a
2 frequency of the output signal to cause a shift in the phase of the phase reference
3 signal away from zero on a phasor plane.

1 8. The transmitter of claim 7 wherein the origin-offset signal generator
2 adjusts an amplitude and phase of the origin-offset signal based on a non-linearly
3 amplified output signal.

1 9. The transmitter of claim 1 further comprising an output amplifier to
2 amplify the output signal generated by the signal synthesizer prior to being
3 combined by the output combining element.

1 10. The transmitter of claim 7 wherein the output amplifier is a non-linear
2 power amplifier.

1 11. The transmitter of claim 1 wherein the output signal is one of a
2 plurality of frequency channels in a WCDMA communication system.

1 12. The transmitter of claim 5 wherein at least one of the phase and
2 amplitude difference elements, the signal synthesizer, the feedback phase and

3 amplitude detectors and the input phase and amplitude detectors are fabricated as
4 part of a digital signal processor (DSP).

1 13. A wireless communication device comprising:
2 a phase difference element to generate a phase reference signal from phase
3 information extracted from an offset input signal and an offset output signal;
4 an amplitude difference element to generate an amplitude reference signal
5 from amplitude information extracted from the offset input signal and the offset
6 output signal;
7 a signal synthesizer to generate an output signal from the amplitude
8 reference signal and the phase reference signal;
9 an input combining element to combine an input signal with a
10 compensation signal to generate the offset input signal;
11 an output combining element to combine the output signal and the
12 compensation signal to generate the offset output signal;
13 a non-linear power amplifier to amplify the output signal generated by the
14 signal synthesizer prior to being combined by the output combining element; and
15 an origin-offset signal source generator to generate the compensation
16 signal.

1 14. The communication device of claim 13 further comprising a carrier
2 leakage compensation element to down-convert the compensation signal from a
3 radio frequency (RF) to an intermediate frequency (IF), and wherein the input
4 combining element combines the input signal with the IF compensation signal to
5 generate the offset input signal.

1 15. The communication device of claim 13 wherein the origin-offset signal
2 source generator generates the compensation signal at a frequency of the output
3 signal.

1 16. A method of generating an output signal comprising:
2 generating a phase reference signal from phase information extracted from
3 an offset input signal and an offset output signal;

4 generating an amplitude reference signal from amplitude information
5 extracted from the offset input signal and the offset output signal;
6 generating an output signal from the amplitude reference signal and the
7 phase reference signal;
8 combining an input signal with a compensation signal to generate the
9 offset input signal; and
10 generating the output signal and the compensation signal to generate the
11 offset output signal.

1 17. The method of claim 16 further comprising adding the compensation
2 signal directly to the input signal in a digital signal processor to generate the offset
3 input signal.

1 18. The method of claim 16 further comprising:
2 extracting phase information from the offset input signal; and
3 extracting amplitude information from the offset input signal.

1 19. The method of claim 16 further comprising:
2 extracting phase information from the offset output signal; and
3 extracting amplitude information from the offset output signal.

1 20. The method of claim 16 further comprising generating the
2 compensation signal at a frequency of the output signal

1 21. The method of claim 16 further comprising amplifying the output
2 signal generated by the signal synthesizer with a non-linear power amplifier prior
3 to combining the output signal with the compensation signal.

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1 22. A digital signal processor (DSP) comprising:
2 a phase difference block to generate a phase reference signal from phase
3 information extracted from an offset input signal and an offset output signal;
4 an amplitude difference block to generate an amplitude reference signal
5 from amplitude information extracted from the offset input signal and the offset
6 output signal;
7 a signal synthesizer block to synthesize an output signal from the
8 amplitude reference signal and the phase reference signal; and
9 an input-combining block to add an input signal with an origin-offset
10 signal to produce the offset input signal.

1 23. The DSP of claim 22 further comprising a carrier leakage
2 compensation block to adjust an amplitude and phase of the origin-offset signal
3 based on a carrier leakage level of the output signal to provide a compensated
4 origin-offset signal to the input-combining block, the carrier leakage
5 compensation block adjusting the origin-offset signal based on a ratio of an RMS
6 level and an average level of the output signal.

1 24. The DSP of claim 23 wherein the output signal is coupled external to
2 the DSP and combined with the origin-offset signal to produce the offset output
3 signal